

# A Latent Profile Analysis of Aggression and Victimization Across Relationship Types Among Veterans Who Use Substances

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**ABSTRACT. Objective:** This study examined patterns of violence victimization and aggression in both intimate partner and nonpartner relationships among U.S. military veterans using latent profile analysis to identify subtypes of violence involvement. **Method:** Participants were 839 substance use treatment-seeking veterans (93% male) from a large Veterans Affairs Medical Center who completed screening measures for a randomized controlled trial. **Results:** Past-year violence involvement, including both intimate partner violence (IPV) and nonpartner violence (NPV), was common in the sample, although NPV occurred at somewhat higher rates. When we included either IPV or NPV aggression or victimization, more than 40% reported involvement with physical violence, 30% with violence involving injury, and 86% with psychological aggression. Latent profile analysis including both aggression and victimization in partner and nonpartner relationships indicated

a four-profile solution: no/low violence (NLV;  $n = 377$ ), predominantly IPV ( $n = 219$ ), predominantly NPV ( $n = 134$ ), and high general violence (HGV;  $n = 109$ ). Multinomial logistic regression analyses revealed that, compared with the NLV group, the remaining three groups differed in age, cocaine use, posttraumatic stress disorder (PTSD) symptoms, and legal involvement. Legal issues appeared to differentiate the profiles most, with the predominantly NPV and HGV profiles reporting more instances of driving under the influence and the HGV profile reporting legal problems related to aggression. **Conclusions:** IPV and NPV are fairly common among veterans seeking substance use treatment. The clinical characteristics of violence profiles indicate that cocaine use, PTSD symptoms, and legal involvement are treatment needs that vary with violence profile and may be useful for clinical decision making. (*J. Stud. Alcohol Drugs*, 78, 597–607, 2017)

**I**NVOLVEMENT WITH VIOLENCE (i.e., aggression and/or victimization) is a significant public health concern, affecting approximately 30% of Americans in their lifetimes, and is associated with an array of psychosocial problems, including substance use (Resnick et al., 1997; Rhodes et al., 2009; Tjaden & Thoennes, 2000). Experiencing victimization is also associated with a variety of mental and physical health complaints as well as decreased occupational functioning (Byrne et al., 1999; Tjaden & Thoennes, 2000).

Engaging in aggression is also associated with poorer health, including substance abuse and risk of HIV (Dunkle et al., 2006; Raj et al., 2008).

There is a strong relationship between substance use and violence (Murphy & Ting, 2010). For example, rates of intimate partner violence (IPV), including either aggression or victimization, often exceed 50% among patients in substance use disorder (SUD) treatment settings (Brown et al., 1998; Chermack et al., 2000; Schumm et al., 2009). The few studies that have also assessed violence in nonpartner relationships (e.g., friends, strangers, acquaintances) among patients in SUD treatment show similar rates of nonpartner violence (NPV) (Chermack et al., 2000; Murray et al., 2008). In fact, when taking into account past-year involvement in either IPV or NPV among SUD patients, Chermack et al. (2000) found that greater than 70% of patients reported physical aggression perpetration. This is consistent with research demonstrating that the risk of any one type of violence increases the risk of almost all other types of violence (Hamby & Grych, 2013). The purpose of the present study was to identify patterns of violence involvement in partner

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and nonpartner relationships among SUD treatment-seeking veterans.

### *Violence involvement in veterans*

IPV and NPV are relatively common problems among veterans, with factors such as SUDs, posttraumatic stress disorder (PTSD), and more recent service era (the time period/conflict during enlistment) related to higher rates of violence (Elbogen et al., 2014; Gierisch et al., 2013; LaMotte et al., 2014; Marshall et al., 2005). Rates of past-year IPV involvement among veterans with SUDs have been estimated in the 42%–54% range (Chermack et al., 2008; Teten et al., 2009). The elevation of violence involvement in veterans with SUDs is consistent with biopsychosocial theories postulating that historical factors (e.g., prior violence exposure), psychological characteristics (psychological symptoms), alcohol and/or other drug use, and social/contextual factors have an impact on the risk of violence involvement (Beck et al., 2013; Chermack et al., 2009).

Thus, despite progress in research regarding IPV treatment among veterans (e.g., Marshall et al., 2005; Taft et al., 2013), examination of violence involvement broadly is under-explored in this population. There are very few interventions designed specifically to address NPV, despite the frequency of this problem. Veterans tend to have high rates of problems that are associated with violence, including poorer physical health functioning, PTSD and exposure to violence, and heavy alcohol use (Elbogen et al., 2014; Gierisch et al., 2013; Hoerster et al., 2012; LaMotte et al., 2014; Marshall et al., 2005). Given these previous findings, it is important to explore profiles of violence among veterans with SUDs to assist with the prevention and treatment of violence-related problems in this population.

### *Forms of violence*

An additional limitation of prior work includes lack of measurement of multiple forms of violence (psychological, physical, and violence involving injury). Specifying the form of violence is important because different forms of violence tend to have different correlates and clinical outcomes (Epstein-Ngo et al., 2014). Physical assault and injury-related violence are primarily differentiated by severity; physical assault comprises any behavior that is inflicted physically and intended to cause harm, whereas injury is indicated by bone or tissue damage, a need for medical attention, and/or continuing physical pain. Differentiating these forms of violence highlights meaningful clinical differences; when examining only physical assault, it is common to find that women are equally as violent as or more violent than men (Archer, 2000), but when focusing on injury, women are much more likely than men to be seriously injured (Archer, 2000).

There is also greater understanding that psychological forms of abuse, such as causing harm through verbal (e.g., calling names) or nonverbal behavior (e.g., stomping out of the room), can cause psychological distress and are worthy of clinical attention (Coker et al., 2000). Thus, research that better characterizes the heterogeneity of violence involvement is needed to enhance interventions to address this complex problem.

### *Relationship violence: Intimate partner violence versus nonpartner violence*

IPV research has historically focused on specific sample types (e.g., males with domestic violence-related legal problems) and behaviors excluding other forms of violence (NPV) and relationship types. For example, IPV research has often focused on married couples; yet, research indicates that IPV is common in dating relationships and shares risk factors with IPV in other types of relationships (Eaton et al., 2007). Many studies that identified IPV subtypes (e.g., family-only aggressors, borderline/dysphoric, generally violent/antisocial; Holtzworth-Munroe et al., 2003; Walsh et al., 2010), by design, did not include individuals who engage in only NPV. In SUD treatment settings, research has shown some differential correlates for IPV and NPV (Chermack et al., 2000, 2010; Epstein-Ngo et al., 2014), suggesting that potential subtypes exist, but few studies have used person-centered approaches including multiple forms of IPV and NPV.

The research that has examined violence subgroups inclusive of both IPV and NPV provides an interesting foundation for understanding potential violence profiles in SUD treatment populations. For example, Chermack et al. (2009) examined violence-related injury among those in SUD treatment and compared those who injured partners only, nonpartners only, or both. Those injuring nonpartners or both had more severe mood and substance problems. Of note, this study included partnerships of all types, rather than focusing only on married individuals. Another study found that correlates of violence were similar across victimization and aggression but were differentiated by relationship type (IPV, NPV, or both) and gender (Walton et al., 2007), suggesting that a focus on the relationship type rather than the direction of violence may be important for intervention.

### *Current study*

The current study fills a gap in the literature by providing descriptive information (rates, frequencies) of multiple forms of violence and including both aggression and victimization across relationship types among veterans seeking SUD treatment. We recruited a high-risk sample variable in relationship status to represent both IPV and NPV. Specifically, we include a comprehensive measurement of multiple forms of

TABLE 1. Descriptive statistics for violence variables ( $n = 839$ )

Violence form and social domain	$\alpha$	Prevalence: % of sample	$M (SD)$	Non-zero $Mdn$	Range
<b>Intimate partner violence</b>					
Physical violence victimization	.89	26.6%	4.1 (16.2)	4.0	0–225.0
Injury victimization	.49	12.4%	0.9 (3.8)	3.0	0–40.0
Psychological victimization	.77	60.9%	13.0 (19.6)	12.0	0–100.0
Physical violence aggression	.89	23.1%	2.7 (12.6)	3.0	0–250.0
Injury aggression	.71	9.5%	0.5 (3.0)	2.0	0–58.0
Psychological aggression	.73	62.2%	13.0 (18.7)	12.0	0–100.0
<b>Nonpartner violence</b>					
Physical violence victimization	.84	30.0%	3.0 (9.3)	4.0	0–110.0
Injury victimization	.69	21.8%	1.5 (5.3)	3.0	0–60.0
Psychological victimization	.70	68.2%	9.7 (14.5)	8.0	0–83.0
Physical violence aggression	.90	34.3%	4.7 (15.2)	4.0	0–162.0
Injury aggression	.84	18.5%	1.6 (6.9)	4.0	0–108.0
Psychological aggression	.76	74.9%	13.4 (18.5)	9.0	0–100.0

both NPV and IPV aggression and victimization (psychological, physical, injury) and use latent profile analysis (LPA) to empirically derive violence subtypes.

We hypothesized that at least three different profiles would emerge (consistent with prior work, such as that by Holtzworth-Munroe et al., 2003). Although we did not make specific hypotheses about the characteristics of these groups given the lack of research on NPV, particularly among veterans, we expected that groups with greater violence involvement would report more severe clinical characteristics. We chose potential clinical correlates to examine based on biopsychosocial models of violence and prior research (Chermack et al., 2009; Taft et al., 2007; Teten et al., 2009).

## Method

### Participants and procedures

Participants were 839 veterans initiating treatment or receiving treatment after a break in care at the Veterans Affairs (VA) Ann Arbor Healthcare System from 2012 to 2015. Participants were recruited as part of screening for a randomized controlled trial of an intervention for substance use and violence prevention (based on Chermack et al., 2017). The data presented here were obtained during screening for the randomized controlled trial. Inclusion criteria for screening were recent substance use and attendance in outpatient SUD or mental health clinics. Exclusion criteria for screening were living outside the catchment area, inability to provide informed consent (e.g., cognitive difficulties), having a legal guardian, inability to speak/read English, current suicidal intent and plan, acute psychosis, and ongoing participation in another intervention study. Participants were remunerated with \$10.00 gift cards for completing screening measures, which included several surveys and were designed to be completed in approximately 30 minutes. Participants were mostly White (71.5%), male (93.4%), nonpartnered

(69.6%), non-employed (75.9%), low income (average \$10,000–\$19,999), and middle aged ( $M = 48.2$ ,  $SD = 13.3$ ). Nearly two thirds of the sample served in Vietnam (29.4%) or served in Afghanistan and/or Iraq (Operation Enduring Freedom [OEF]/Operation Iraqi Freedom [OIF]) (29.8%). Nearly 18% ( $n = 147$ ) of participants were mandated or recommended to treatment by the criminal justice system. Data were collected under the supervision and approval of the institutional review board of VA Ann Arbor, and the trial is registered on ClinicalTrials.gov (#NCT01337973).

### Measures

**Past-year violence.** Past-year IPV and NPV aggression and victimization were assessed using a shortened version of the Revised Conflict Tactics Scale (CTS2; Straus et al., 1996). The CTS2 uses paired items to assess both aggression (“I hit my partner”) and victimization (“My partner did this to me”) on a frequency scale ranging from 0 (*never*) to 6 (*20+ times*) over the past year. Partner was construed broadly to including dating relationships, for example, “wife/husband/girlfriend/boyfriend/lady friend/man friend or intimate acquaintance.” Following convention, we computed frequency variables for each scale using the midpoint anchor of each selected range; alphas were generally acceptable (Table 1).

For the NPV assessment we modified the CTS2 to assess NPV (e.g., “I kicked someone other than my partner” specified as friends, strangers, acquaintances, or people in bars [Chermack et al., 2009; Murray et al., 2008]). Although the parental intervention study focused primarily on reducing physical aggression (including injury) as measured by the CTS2, we also chose to measure psychological aggression in our screening battery using a shortened version of the psychological aggression subscale (4 items were eliminated, reducing the screening battery by 16 items overall); this subscale demonstrated similar internal consistency to the full

scale (Straus et al., 1996). The assessment of IPV excluded violence experienced as a result of combat. See Table 1 for internal consistency of each subscale.

*Current depression symptoms.* The nine-item Patient Health Questionnaire was used to assess past-2-week symptoms (from 0 = *not at all* to 3 = *nearly every day*) of major depression consistent with the criteria listed in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV; American Psychiatric Association, 1994). Items are summed to yield a depression severity score ranging from 0 to 27 (Kroenke & Spitzer, 2002); in this study, Cronbach's  $\alpha$  was .90.

*Current PTSD symptoms.* The PTSD Checklist (PCL; Blanchard et al., 1996) was used to assess PTSD symptoms; Cronbach's  $\alpha$  was .95. The PCL is a 17-item measure that asks participants to rate how frequently they have experienced each of the 17 PTSD symptoms corresponding to DSM-IV criteria on a scale ranging from 1 (*not at all/never*) to 5 (*extremely/daily or almost daily*). Item 17, "feeling jumpy or easily startled," was not administered because of a clerical error. To adjust for this, the mean PCL-C item score was computed to replace item 17 for each participant.

*Past-28-day substance use.* Substance use was assessed using items from the University of Arkansas Substance Abuse Outcomes Module (Smith et al., 2006). Participants indicated the number of days they drank any alcohol as well as the number of days they consumed five or more drinks (e.g., heavy episodic drinking). Similarly, participants indicated the number of days that they used each of the following: marijuana, cocaine or crack, stimulants (prescribed to participant and nonprescribed), opiates (prescribed to participant and nonprescribed), sedatives (prescribed to participant and nonprescribed), and heroin.

*Lifetime legal problems.* Items from the legal subsection of the Addiction Severity Index were administered (McLellan et al., 1992). Because we were interested in distinguishing between legal problems related to aggression or other behaviors, we used factor analysis and correlation to create two composite scales from Addiction Severity Index items. The non-aggressive offenses scale comprised eight items (e.g., shoplifting, vandalism, drug offenses, burglary), and the aggressive offenses scale (e.g., assault, rape, homicide) comprised five items. Following our analyses, the driving under the influence (DUI) item was retained individually as it did not covary significantly with other items. To standardize the distribution, *z* scores were computed.

#### Statistical analysis

LPA is a person-centered statistical approach that assumes heterogeneity in the distribution of sample responses arises from a latent grouping within the population; the primary target of the analysis is to identify the number and properties of the latent groups (Collins & Lanza, 2010). In this analy-

sis, 12 indicator variables (continuously scored) were used to include the three forms of aggression and victimization (physical assault, injury, psychological) in both partner and nonpartner relationships separately.

We conducted the LPA in an exploratory fashion using the R package *flexmix* (Grün & Leisch, 2008). To select the number of profiles, we used the Bayesian information criterion, as recommended elsewhere, while also considering issues of parsimony, interpretability, and generalizability (Nagin, 2005; Nagin & Tremblay, 2005; Nylund et al., 2007). To prevent overfitting of our sample, while also providing both parsimony and sufficient power to conduct between-profile comparisons, we constrained the model fitting so that no profile containing less than 10% of the sample would be formed. This constraint was imposed during model fitting, not post hoc. Thus, the maximum likelihood estimator that obeys this constraint will produce, at most, four profiles. Solutions that obeyed this constraint were then compared using the Bayesian information criterion. To prevent false convergence to a local maximum, all models were re-fit from 1,000 random starting values, and the model that maximized the likelihood for each number of input classes was saved. We evaluated profile separation within the selected model using the relative entropy; values of .8 or greater generally indicate good profile separation.

We conducted bivariate comparisons (i.e., chi-square tests, analysis of variance) to examine differences between the profiles on demographic characteristics and mental health correlates. For this analysis, participants were assigned to their most likely profile using the posterior probabilities generated by the LPA. Variables identified as significant in the bivariate analyses plus gender were retained for the regression analyses; because of high intercorrelation ( $r = .76$ ) between age and service era status, only age was included. We included gender because of the inherently gendered nature of IPV, gender findings in past research, and our unique sample. Last, we conducted a multinomial logistic regression analysis to evaluate multivariable relationships between the mental health correlates identified and violence profiles while accounting for shared variance and demographics. In terms of missing data, no variable exceeded 2% missing. Following, we did not conduct data imputation and used listwise deletion in the regression analysis.

## Results

#### *Descriptive information regarding intimate partner violence and nonpartner violence*

Table 1 provides details regarding measures of past-year IPV and NPV aggression and victimization in the sample. Collapsing across all three forms of violence and including victimization and aggression, 75.6% of participants reported any NPV, 64.6% reported any IPV, with 86.3% reporting any

TABLE 2. Fit indices for latent profile models

No. of profiles in model	BIC	SSA-BIC	VLMR	LMR	Entropy
1-profile	75,218.72	75,142.51	—	—	—
2-profile	48,102.48	47,946.87	27,284.55	27,213.39	.99
3-profile	41,991.34	41,014.57	6,279.45	6,242.36	.99
4-profile	39,162.92	38,848.53	2,996.73	2,979.03	.98

Notes: BIC = Bayesian information criterion; SSA-BIC = sample size-adjusted BIC; VLMR = Vuong–Lo–Mendell–Rubin likelihood ratio test; LMR = Lo–Mendell–Rubin adjusted likelihood ratio test.

violence across relationships. IPV victimization and aggression were highly intercorrelated,  $r(837) = .90, p < .001$ . This was also true for NPV victimization and aggression,  $r(837) = .76, p < .001$ .

Considering physical assault only, rates were 34.3% (NPV) and 23.1% (IPV), with 42.1% reporting either. IPV physical assault victimization and physical assault aggression were highly correlated,  $r(837) = .66$ , as was physical assault for NPV victimization and aggression,  $r(837) = .80, p < .001$ . Rates of injury-related aggression or victimization ranged from approximately 10% to 22%. IPV physical assault and injury aggression were highly intercorrelated,  $r(837) = .85, p < .001$ , as were IPV physical assault and injury victimization,  $r(837) = .75$ . Results were extremely similar for NPV.

#### Results of latent profile analysis

A four-profile solution was preferred; see Table 2 for a comparison to less than four-profile solutions (subject to the profile size constraint above, a five-group solution is considered inadmissible). The relative entropy for the final solution was .98, indicating excellent separation between classes and thus high certainty about individuals' class membership.

Table 3 displays the profile means and standard deviations for each indicator variable included in the LPA; Figure 1 graphically displays these means. Of note, these figures represent estimated frequency counts for each type of behavior; these counts do not necessarily represent separate incidents, as a single altercation may include multiple behaviors. For example, an altercation may include both name calling and punching, which would be counted separately in these estimates.

*No/low violence profile.* The largest and least violent profile ( $n = 377$ , or 44.9%) was characterized as the no/low violence (NLV) profile, in which participants reported low violence across all three violence forms and both relationship types. Indeed, the mean estimates were zero in all categories examined, with the exception of psychological violence. Among individuals with this profile, the means for counts of psychological victimization were very similar to those for counts of psychological aggression.

*Predominantly intimate partner violence profile.* The second profile ( $n = 219$ , 26.1%) was characterized as the predominantly intimate partner violence (PIPV) profile because these participants reported higher levels of IPV, particularly victimization, compared with NPV (although the levels of NPV were still greater than NPV levels in the NLV profile).

TABLE 3. Means and standard deviations by violence domain and latent profile

Form of violence	Profile 1: NLV ( $n = 377$ , 44.9%)	Profile 2: PIPV ( $n = 219$ , 26.1%)	Profile 3: PNPV ( $n = 134$ , 16.0%)	Profile 4: HGV ( $n = 109$ , 13.0%)
<b>Intimate partner</b>				
Victimization				
Physical violence	0 (0)	2.69 (5.12)	0.56 (1.49)	25.35 (38.00)
Injury	0.0 (0.0)	0.36 (0.94)	0 (0)	5.91 (9.03)
Psychological	3.56 (6.58)	18.59 (18.45)	9.20 (13.49)	39.17 (29.13)
Aggression				
Physical violence	0.0 (0)	1.35 (2.39)	0.24 (0.77)	17.36 (31.15)
Injury	0.0 (0.0)	0.18 (0.61)	0.0 (0)	3.60 (7.60)
Psychological	3.43 (6.51)	18.35 (17.93)	8.85 (12.77)	40.63 (23.53)
<b>Nonpartner</b>				
Victimization				
Physical violence	0 (0)	0.42 (0.90)	5.37 (5.78)	15.39 (20.47)
Injury	0 (0)	0 (0)	3.01 (4.14)	8.17 (11.81)
Psychological	3.36 (5.37)	8.63 (12.01)	18.74 (17.91)	22.92 (20.63)
Aggression				
Physical violence	0 (0)	0.72 (1.28)	6.39 (6.69)	24.41 (29.86)
Injury	0 (0)	0 (0)	2.03 (2.77)	9.93 (16.68)
Psychological	5.42 (9.16)	11.56 (14.47)	22.21 (19.71)	34.06 (26.58)

Notes: All variables are significantly different across profiles at  $p < .001$ . NLV = no/low violence; PNPV = predominantly nonpartner violence; PIPV = predominantly intimate partner violence; HGV = high general violence.

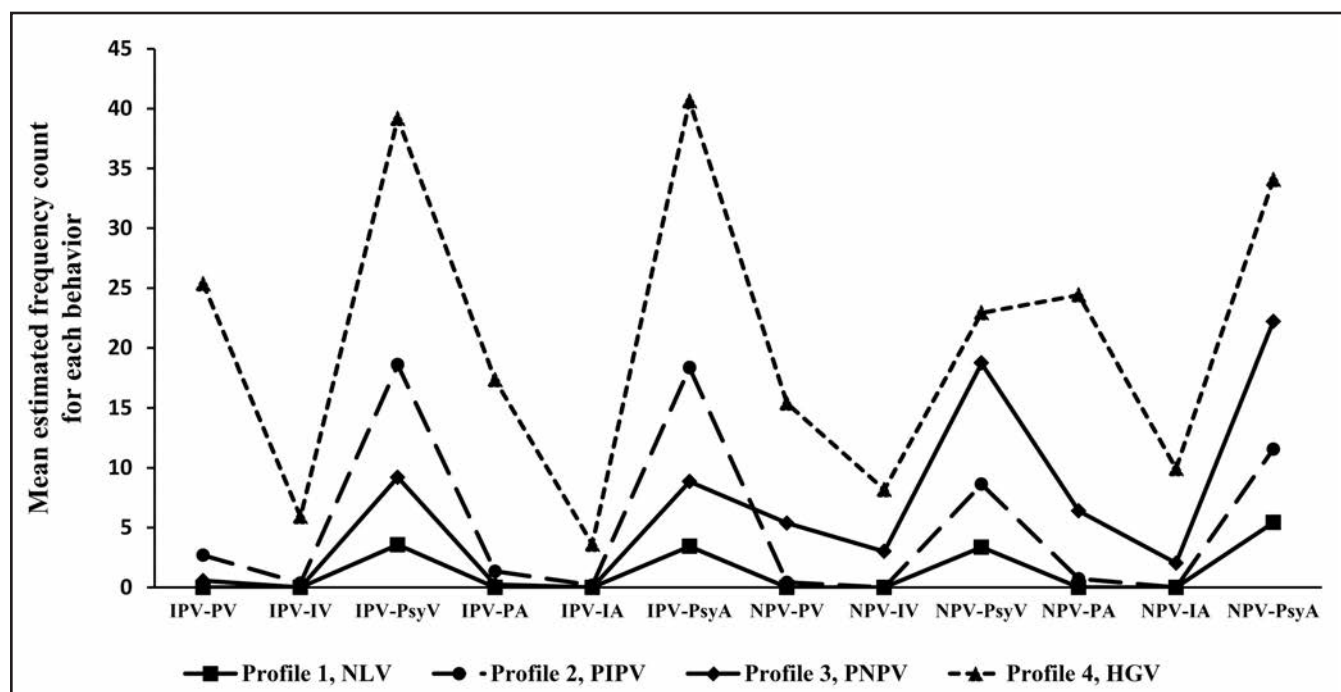


FIGURE 1. Means by violence domain and latent profile. IPV = intimate partner violence; NPV = nonpartner violence; PV = physical violence victimization; IV = injury victimization; PsyV = psychological victimization; PA = physical violence aggression; IA = injury aggression; PsyA = psychological aggression; PNPV = predominantly NPV; PIPV = predominantly IPV; HGV = high general violence; NLV = no/low violence.

For example, participants in this profile reported an average of 2.69 counts of IPV physical victimization in the past year and an average of 0.42 counts of NPV physical victimization. These participants reported asymmetric violence in the IPV variables, reporting more victimization than aggression in counts of physical violence and injury-related violence whereas psychological violence was symmetric.

*Predominantly nonpartner violence profile.* The next profile ( $n = 134$ , 16.0%) was characterized as the predominantly nonpartner violence (PNPV) profile, as these participants reported the opposite pattern with relatively high levels of NPV. The mean count of NPV physical victimization was 5.37 versus 0.56 for IPV physical victimization. In this profile, participants reported generally symmetric levels of violence within NPV and IPV.

*High general violence profile.* The final profile ( $n = 109$ , 13.0%) was characterized as the high general violence (HGV) profile, and participants with this profile reported moderate to high levels of IPV as well as high levels of NPV. Of note, the participants in the HGV profile reported the highest level of injury-related violence, reporting means three to nine times higher those of other profiles. For IPV, participants with this profile reported greater victimization than aggression, whereas for NPV, these participants reported greater aggression than victimization, demonstrating asymmetry in both domains, yet in opposite directions.

#### *Differences in clinical characteristics among the profiles*

Results of chi-square and analysis of variance tests (selected results shown in Table 4) revealed that individuals comprising the four profiles did not vary significantly by gender, current employment status, income, education level, and several substance use variables (days of use for alcohol, marijuana, stimulants, sedative/hypnotics, or heroin). However, there were significant profile differences on age, cocaine use, legal problems related to aggression, non-aggression legal problems, depression symptoms, OEF/OIF/Operation New Dawn (OND) status, and PTSD symptoms (Table 4). There was no significant difference between the identified profiles on whether treatment was mandated,  $\chi^2(3, 829) = 1.51, p = .68$ .

Results of the multinomial logistic regression model using the NLV profile as the comparison group are shown in Table 5. Compared with the NLV profile, the participants of the PIPV profile were younger, more likely to be married, used more cocaine/crack, and experienced more PTSD symptoms. In comparison with the NLV profile, the PNPV profile participants were younger, used more cocaine/crack, had more DUIs, and had higher PTSD symptoms. Last, compared with the NLV profile, the HGV profile participants were younger, used more cocaine/crack, had more PTSD symptoms, and had more legal problems including problems related to aggression and DUIs.

TABLE 4. Profile differences in clinical characteristics ( $N = 839$ )

Variables	NLV (1) ( $n = 377$ , 44.9%)	PIPV (2) ( $n = 219$ , 26.1%)	PNPV (3) ( $n = 134$ , 16.0%)	HGV (4) ( $n = 109$ , 13.0%)	Statistical test (omnibus)
Age, $M$ ( $SD$ )	50.98 (12.86) <sup>a,b</sup>	48.19 (12.73) <sup>c</sup>	45.43 (13.86) <sup>b</sup>	42.37 (12.94) <sup>a,c</sup>	$F(3, 838) = 15.07, p < .001$
Gender, $n$ (% women)	20 (5.3%)	18 (8.2%)	7 (5.2%)	10 (9.2%)	$\chi^2(3, 839) = 3.56, p = .31$
Marital status, $n$ (% married)	84 (22.3%)	76 (34.7%)	22 (16.4%)	20 (18.3%)	$\chi^2(3, 839) = 20.45, p < .001$
OEF/OIF/OND, $n$ (%)	85 (22.5%) <sup>a</sup>	67 (30.6%) <sup>a,b</sup>	48 (35.8%) <sup>a</sup>	50 (45.9%) <sup>a,b</sup>	$\chi^2(3, 839) = 25.33, p < .001$
No. of days HED, $M$ ( $SD$ )	9.45 (11.83)	7.81 (10.65)	7.82 (10.44)	10.80 (11.38)	$F(3, 830) = 2.40, p = .07$
No. of days marijuana, $M$ ( $SD$ )	3.82 (8.77) <sup>a</sup>	4.15 (9.01)	4.88 (9.53)	6.41 (10.74) <sup>a</sup>	$F(3, 835) = 2.40, p = .07$
No. of days cocaine/crack, $M$ ( $SD$ )	0.83 (3.51) <sup>a</sup>	1.92 (6.05)	2.73 (7.24) <sup>a</sup>	3.49 (7.90) <sup>a</sup>	$F(3, 836) = 8.25, p < .001$
Legal, $Z$ score					
Aggressive charges	-0.25 (2.47) <sup>a</sup>	-0.20 (2.37) <sup>b</sup>	0.37 (3.02)	0.81 (3.79) <sup>a,b</sup>	$F(3, 831) = 5.31, p = .001$
Nonaggressive charges	-0.24 (1.66) <sup>a</sup>	-0.06 (2.73) <sup>b</sup>	0.04 (1.67) <sup>c</sup>	0.88 (4.53) <sup>a,b,c</sup>	$F(3, 830) = 5.63, p = .001$
Depression symptoms, $M$ ( $SD$ )	9.34 (6.76) <sup>a</sup>	12.17 (6.98) <sup>a,b</sup>	11.48 (6.32) <sup>a,c</sup>	14.36 (6.01) <sup>a,b,c</sup>	$F(3, 838) = 19.55, p < .001$
PTSD total score, $M$ ( $SD$ )	40.00 (16.33) <sup>a</sup>	47.26 (16.32) <sup>a,b</sup>	47.74 (14.31) <sup>a,c</sup>	54.79 (14.76) <sup>a,b,c</sup>	$F(3, 838) = 29.31, p < .001$

Notes: <sup>a,b,c</sup>Superscripted letters indicate significant differences between profiles marked with paired letters. In the entire sample, the number of participants who reported any level of the following substances were: HED,  $n = 476$ ; marijuana,  $n = 259$ ; cocaine/crack,  $n = 130$ ; stimulants—prescribed,  $n = 31$ ; sedatives/hypnotics—not prescribed,  $n = 57$ . NLV = no/low violence; PIPV = predominantly intimate partner violence; PNPV = predominantly nonpartner violence; HGV = high general violence; OEF/OIF/OND = Operation Enduring Freedom, Operation Iraqi Freedom, or Operation New Dawn; no. = number; HED = heavy episodic drinking; PTSD = posttraumatic stress disorder.

## Discussion

Violence involvement is associated with many deleterious consequences, including poor mental and physical health (Resnick et al., 1997). This study is the first to provide comprehensive information on violence involvement across multiple forms and relationship types among a treatment-involved sample of veterans. We found higher rates of NPV involvement than IPV involvement; this is consistent with other research that has examined both domains of violence in other SUD treatment settings (Chermack et al., 2009). The rates of both IPV and NPV in this sample were somewhat lower than those found in community or justice-referred samples (Beck et al., 2013; Crane et al., 2014), possibly because of the higher mean age (48 years) and lower number of married couples in the present sample. The common presence of IPV and NPV highlights the importance of comprehensive screening for violence involvement in VA treatment clinics. When both NPV and IPV victimization and aggression measures were considered, 48% of the sample

was identified as being involved with physical violence, 30% with injury-related violence, and 86% with psychological violence.

The present study is unique in applying LPA to “subtype” or characterize violence involvement by incorporating all violence variables simultaneously. Such an approach is crucial to more fully understand potential typologies of violence and associated treatment needs for veterans. Indeed, our results are markedly different from much past research in IPV subtyping, likely reflecting the sample of veterans seeking SUD treatment and our comprehensive measurement of multiple forms of violence across relationship types (Holtzworth-Munroe & Stuart, 1994; Langhinrichsen-Rohling et al., 2012).

We identified four profiles of veteran SUD treatment seekers who were characterized primarily by the relationship type and severity of violence involvement; severity of violence was also a key differentiating factor in prior research (Ansara & Hindin, 2010; Beck et al., 2013). Although typical of veteran SUD treatment samples, nonetheless, our

TABLE 5. Multinomial regression analysis of clinical characteristic by profile compared with the no/low violence profile

Variable	Profile 2: PIPV Exp( $B$ ) [95% CI]	Profile 3: PNPV Exp( $B$ ) [95% CI]	Profile 4: HGV Exp( $B$ ) [95% CI]
Age	<b>0.98 [0.97, 1.00]</b>	<b>0.96 [0.95, 0.98]</b>	<b>0.94 [0.93, 0.96]</b>
Gender	1.45 [0.72, 2.92]	0.89, [0.35, 2.24]	1.33 [0.56, 3.21]
Marital status	<b>2.28 [1.53, 3.41]</b>	1.08 [0.62, 1.88]	1.35 [0.74, 2.48]
No. days cocaine or crack	<b>1.06 [1.01, 1.10]</b>	<b>1.09 [1.04, 1.13]</b>	<b>1.09 [1.05, 1.14]</b>
Legal charges			
Aggression	1.00 [0.92, 1.10]	1.04 [0.96, 1.13]	<b>1.09 [1.01, 1.18]</b>
Nonaggressive	1.03 [0.93, 1.13]	0.99 [0.86, 1.12]	1.07 [0.98, 1.18]
Driving under the influence	1.14 [0.92, 1.42]	<b>1.50 [1.21, 1.86]</b>	<b>1.32 [1.03, 1.69]</b>
Depression symptoms	1.02 [0.98, 1.06]	0.98 [0.94, 1.03]	1.01 [0.96, 1.07]
PTSD	<b>1.02 [1.00, 1.04]</b>	<b>1.03 [1.01, 1.06]</b>	<b>1.05 [1.03, 1.08]</b>

Notes: **Bolded** values indicate statistically significant differences at the  $p < .05$  level or lower.  $R^2 = .20$  (Cox & Shell), .22 (Nagelkerke); Model fit  $\chi^2(27) = 188.33, p < .001$ . PIPV = predominantly intimate partner violence; PNPV = predominantly nonpartner violence; HGV = high general violence; no. = number; PTSD = posttraumatic stress disorder.

sample had few married participants; thus, replication is required with SUD treatment settings containing larger proportions of married participants. The severity of violence in the profiles spanned the entire range from low severity in the NLV group, low to moderate severity in the predominantly IPV and NPV profiles, to severe levels in the HGV profile. The profiles varied with regard to the symmetry of victimization and aggression within types of violence, indicating that in addition to relationship type, symmetry/asymmetry may be a relevant characteristic for understanding subtypes of violence involvement among veterans and associated treatment needs. Of note, in all profiles the violence variables exclude combat exposure and are specific to noncombat IPV.

Contrary to some characterizations of IPV, this study did not find support for the “intimate terrorist” model of IPV (i.e., a group with high levels of partner aggression with low levels of partner victimization) (Johnson, 2005). This may be partially because of our more comprehensive approach to measuring violence or because of the type of sample, which included veterans with substance misuse seeking treatment as opposed to court-ordered domestic violence samples. However, it is also possible that our predominantly male participants (particularly in the HGV profile) may have been reluctant to admit severe violence to or from partners. Our results are consistent with studies of nonveteran samples that have suggested that the most common type of partner violence is “mutual aggression and victimization” (Straus, 2015). Further research using data from dyads is recommended (Leonard et al., 2014), although married dyads may not encompass all IPV given that such violence frequently occurs in dating and other more casual relationships (Eaton et al., 2007).

We used the LPA results to identify how clinical characteristics consistent with biopsychosocial models of violence were differentially associated with the empirically derived profiles. Compared with the NLV group, individuals in the remaining three profiles were more likely to be younger, to use cocaine/crack, and to experience PTSD symptoms. Patterns of legal issues varied between groups, with participants assigned to the predominantly NPV and HGV profiles reporting more DUIs and the HGV profile individuals also reporting a greater number of legal problems related to aggression. Of note, we were unable to determine whether legal problems predated substance use or vice versa.

Consistent with hypotheses and prior research, the individuals comprising the HGV profile had the most severe clinical characteristics, reporting the highest means for substance use across multiple substances, depression symptoms, and PTSD symptoms (Shorey et al., 2012, 2014; Taft et al., 2007). The HGV group was relatively young and had the highest rate of OEF/OIF/OND veterans in bivariate analyses. Of note, it is cocaine use that remained significant in multivariate analyses, highlighting this substance as an important indicator of violence involvement. Although we investigated

some of the clinical correlates most common in SUD clinics, we recommend that future research investigate modifiable, individual difference variables to inform tailored intervention programs. For example, we recommend future research on constructs like trait anxiety, distress tolerance, and coping skills, which have been shown in prior research to be related to clinical outcome (Bonar et al., 2013; Bornovalova et al., 2012; Lejuez et al., 2008; Levin et al., 2007).

Based on the different violence profiles identified in this article, different types of clinical intervention may be warranted. Given the cross-sectional nature of these data, we present the following suggestions as potential hypotheses for future research. Our findings are clinically significant in identifying differences in the severity and type of violence involvement among veterans. Specific to each profile, individuals with a predominantly IPV profile may benefit from an intervention that targets relationship violence (e.g., behavioral couples therapy [O’Farrell & Schein, 2011], Strength at Home [Taft et al., 2013]) and substance use, especially given evidence that violence remits as substance use remits (Chermack et al., 2017; Schumm et al., 2009). The predominantly NPV and HGV groups may benefit more from interventions more focused on alcohol and general violence prevention (e.g., anger management) as well as case management, given their legal problems. Prior studies suggest more positive SUD treatment outcomes with close coordination with the legal system (Crane et al., 2014; Friedmann et al., 2009). For example, the VA Veteran’s Justice Outreach program (e.g., coordinates substance use and mental health services and legal issues) shows positive clinical and legal outcomes (Slattery et al., 2013). Further, all the violence profiles showed elevated PTSD symptoms, suggesting the importance of incorporating or integrating interventions addressing PTSD (e.g., prolonged exposure). Last, the findings showing higher rates of violence among younger and/or OEF/OIF/OND veterans highlight the importance of VA/Department of Defense initiatives (e.g., Services for Returning Veterans-Mental Health [SeRV-MH], Veterans Integration to Academic Leadership [VITAL], Transition and Care Management) that reach out to returning veterans with the goal of engaging veterans in needed care and providing care management.

The present study has a number of limitations. First, participant reports of violence were not able to be corroborated. Prior studies have tended to show acceptable concordance of participant and collateral reports of violence and substance use, with a general tendency for participants to underreport their own aggression (Epstein-Ngo et al., 2014; LaMotte et al., 2014; Murray et al., 2008; Panuzio et al., 2006; Tharp et al., 2016); thus, it may be that the relationships identified in the present study are underestimated. Future research should examine models in partnered versus nonpartnered participants to examine how relationship status may affect profile. We also recommend recruiting larger numbers of female veterans who may have different clinical characteristics. Given

the novelty of our findings and statistical approach, replication is required and longitudinal research needed to examine intervention outcomes as well as how profile membership may change over time and social context. We recommend that future research improve understanding of typologies by including sexual violence, which may be relatively common in IPV-involved couples and may be a differentiating factor (Bagwell-Gray et al., 2015). Last, the present sample was veterans seeking treatment, with a relatively small percentage of female participants. Although the identified profiles did not differ in gender, it is possible that with a larger sample of women, different clinical characteristics would appear for women.

To summarize, the present study provides important and novel information regarding violence involvement (aggression and victimization) among veterans in VA treatment, including the identification of potential violence subtypes. Overall, violence involvement was common (with NPV appearing more common than IPV), and those involved with more severe levels of violence had more severe clinical characteristics (cocaine use, PTSD symptoms, legal problems). Future research is needed to explore the impact of current and promising new approaches targeting violence prevention for both IPV and NPV (e.g., Substance Abuse–Domestic Violence Treatment [Easton et al., 2007]; approaches integrating motivational interviewing and cognitive behavioral therapy [Chermack et al., 2017]), including those that coordinate with the legal system when indicated, and/or that incorporate partners/families (behavioral couples therapy, Strength at Home).

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